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The genus belongs to the Monimiaceæ, and is peculiar to tropical America, with its greatest development in southern Brazil. In 1868, in his monograph of the genus for the *Prodromus*, A. DeCandolle recognized 28 species, two of them being regarded as doubtful. In the present monograph 71 species are presented, 46 of them being described for the first time.— J. M. C.

A REVISION of the North American species of *Euphorbia* § *Tithymalus* has been published by J. B. S. NORTON in the 11th annual report of the Missouri Botanical Garden, illustrated by 42 plates. Thirty-six species are recognized, eight of them introduced from Europe, and one of them new. The section contains about 400 species of the 700 or more that have been described, but is rather poorly represented in America, the greater number being southwestern and xerophytic.— J. M. C.

# NOTES FOR STUDENTS.

MR. FRANCIS E. LLOYD is making a vigorous study of the comparative embryology of the Rubiaceæ. His first paper<sup>9</sup> outlines the task before him and discusses the development of *Vaillantia hispida*, one of the Galieæ indigenous to the Mediterranean region, from earliest stages to mature fruit, paying special attention throughout to the matter of nutrition. The chief characteristics of this species are : a multicellular archesporium; a single integument; migration of the megaspore mother cell and development in the micropyle; great development of antipodals for the sake of securing food to the growing embryo-sac, and the development of a suspensor with cells clustered like a "bunch of grapes," which breaks down with the appearance of the cotyledons. There is found an abundant source of food supply and an efficient means of transmitting it during every stage of development, until finally the plant by way of the vascular region deposits a supply of starch and cellulose in the tissues surrounding the mature embryo.—J. E. WEBB.

BARANETZKY, to whom we owe an improved form of the registering auxanometer, describes <sup>10</sup> a new apparatus for recording the periodic curvatures of leaves and stems. The registering apparatus itself consists of a drum, carrying smoked paper, and rotated by clockwork once in twenty four hours. The writing point, a bit of flexible metal, is attached to a vertical belt, longer than the drum, passing over pulleys actuated in opposite directions by one or the other of two electromagnets on the base. The leaf stalk or stem to be studied is fastened to a swinging lever which actuates a train of three wheels by which the movements are magnified. The third axle carries a spur wheel, which, by bending aside a flexible platinum strip.

<sup>9</sup>LLOYD, F. E.: The comparative embryology of the Rubiaceæ. Bull. Torr. Bot. Club 8: 1-25. pl. 1-3. 1899.

<sup>10</sup> Berichte d. deutsch. bot. Gesells. 17: 190. 1899.

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closes an electric circuit through one or the other of the electromagnets. One electromagnet, actuating one of the pulleys over which the belt passes, raises the writing point, while the other lowers it, thus recording a corresponding deflection of the organ. In the instrument used by Baranetzky a deflection of 1° was recorded by a 2 mm step in the record line. He thinks the instrument capable of twice as great sensitiveness.- C. R. B.

HOFMEISTER in his description of the Balanophoraceæ, which reappears in the text-books," describes the pistil as a carpel containing a single

integumented ovule, attached laterally near the top; fertilization attends the introduction of a pollen tube; a five to eight-celled embryo develops and is attached to the wall of the sac by a suspensor. After a cursory examination of Balanophora Indica, using material secured from India, van Tieghem 12 declares that there is no ovule or placenta; that the megaspore is plunged into the tissue at the base of the style; that there is no fusion of polar nuclei, and that fertilization occurs rather indifferently at either the sexual or the antipodal end of the sac. Treub<sup>13</sup> has now published a very close series of figures from earliest stages to mature fruit, drawn from sections of B. elongata which occurs abundantly in the neighborhood of the Buitenzorg Gardens in Java. Treub finds no ovule or placenta; there is an epidermal growth above the embryo-sac designated as the style; the polar nuclei do not fuse and the development of the endosperm invariably results from growth and division of the polar cell of the egg apparatus. Periclinal walls cut off a cell in the midst of the endosperm which develops into a five to ten-celled pseudoembryo. Treub decides against fertilization, but in a species in which staminate flowers occur. Dr. Lotsy,14 however, confirms him in every particular, including non-fertilization, from observations upon B. globosa, a species which, in his neighborhood at least, has no staminate flowers. He objects to using the word "style" at all in comparing this curious organ with the floral structures of other plants. For hints with regard to the course of reduction and its point of departure both Treub and Lotsy look forward to the study of Rhopalocnemis phalloides Jungh. and other forms. Dr. Lotsy is very anxious that Balanophora Indica be worked over again with much care, and perhaps with special reference to cytological problems.-J. E. WEBB.

"ENGLER and PRANTL: Natürlichen Pflanzenfamilien III. 1:261. SCHENK: Handbuch 3<sup>1</sup>: 369.

<sup>12</sup> VAN TIEGHEM, PH.: Sur l'organisation florale des Balanophoracées. Bull. Bot. Soc. de France 43: ---, 1896.

<sup>13</sup> TREUB, MELCHOIR : L'organe femelle et l'apogamie du Balanophora elongata, Bl. Ann. Jard. Buitenz. 15: 1-22, pl. 1-8. <sup>14</sup> LOTSY, DR. J. P.: Balanophora globosa Jungh. Ann. Jard. Buitenz. IL 1: 174-186, pl. 26-29. 1899.

### BOTANICAL GAZETTE

APRIL

AN UNUSUAL paper has appeared on *Drosera rotundifolia*. It is a cytological and physiological study of this interesting plant by Otto Rosenberg<sup>15</sup> of Stockholm, whose investigations were conducted chiefly at Bonn. The examination is suggestive of methods of study in cytology that are soon likely to come to the front, namely, studies upon protoplasm that has been subjected to various conditions in the attempt to analyze the factors that influence its minute structure.

The paper is divided into two parts : the first, on forms of nuclear division, and the second, on the physiological behavior of the nucleus. The first part considers mitoses in various tissues, reproductive and vegetative. One notes that the spindles in vegetative cells are developed from caps of kinoplasm, and in the pollen mother cell the presence of a delicate zone of granular kinoplasm and fibrillæ encircling the nucleus indicates the beginning of the achromatic part of the nuclear figure. However, the account of karyokinesis in the pollen mother cell is not sufficiently detailed to offer evidence on disputed points; it appears that the nucleus is small and not altogether satisfactory for such a study.

Of the physiological studies upon the nucleus the most interesting are naturally those on the cells in the tentacles of the leaf. The most fruitful studies consisted of an examination and comparison of certain epidermal cells before and at successive intervals after the leaves had been fed with various substances. These experiments were tried with a variety of foods, such as albumen, peptone, meat, cheese, sugar, bread, hæmoglobin, and other organic substances, and with such inorganic salts as borax, calcium nitrate, calcium phosphate, and ammonium oxalate. Feeding the leaves with organic material brings about very shortly changes in the cytoplasm and nucleus in the epidermal cells of the tentacles. Peculiar granules appear in the cytoplasm near the nucleus, and the tannin vacuoles become more prominent. But the most conspicuous effects are exhibited in the nucleus. The chromatin increases greatly in quantity along the linin network, and finally collects as longer or shorter rods on the membrane. Finally, when the reactions are most energetic, the chromatin takes the form of a thick thread and the linin network cannot be followed. The nucleolus during this process of feeding usually grows smaller and smaller until it is very insignificant. But there is no fixed relation between the decrease in the size of the nucleolus and the great increase in the amount of chromatin.

These reactions affect other cells in the tentacle, those of the endodermis and stalk exhibiting similar changes.

In general one may say that the feeding of a leaf almost always results in

<sup>15</sup> ROSENBERG, O.: Physiologisch-cytologische Untersuchungen über Drosera rotundifolia L. Upsala 1899.

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the excretion from the epidermis of slime, and this is accompanied by decrease in the amount of cytoplasm and usually by a great increase in the chromatin, while the nucleolus becomes smaller. The investigations point to the nucleus as the chief center in the cell, initiating and carrying out the complex chemical and physical reactions.

There is much detail in this paper of 116 pages and apparently a very complete summary of the literature, together with much suggestive speculation interesting to the student of the plant cell.—B. M. DAVIS.

ITEMS OF TAXONOMIC interest are as follows: A. W. EVANS (Bull. Torr.

Bot. Club 27:97-104. 1900) has described a new genus of Hepaticae (Acromastigum) from the Hawaiian islands, heretofore referred with doubt to Mastigobryum (Bazzania). - E. L. MORRIS (ibid. 105-119) has published a revision of the species of Plantago commonly referred to P. Patagonica Jacq., in which fifteen species are recognized, six of them being described as new.-E. B. ULINE (Field Columbian Mus. Bot. Series 1:413-422. pls. 22-24. 1899) has described a new genus (Higinbothamia) of Dioscoreaceæ from Yucatan, a new Dioscorea, and five new species of Amaranthaceæ.- In the current number of Engler's Botanische Jahrbücher (28:145-272. 1900) the present series of papers (XIX) on the African flora is completed. E. GILG describes a new genus (Brachythalamus) of Thymelæaceæ; E. GILG and K. SCHUMANN describe a new genus (Maschalocephalus) of Rapateaceæ; TH. LOESENER publishes his third paper on African Celastraceæ; F. KRÄNZLIN presents the African Orchidaceæ, describing two new genera (Angraecopsis and Schwartzkopffia.) In the same number P. HENNINGS publishes a list of Japanese fungi, describing a new genus (Hydnofomes) of Hydnaceæ. - In Deutsch Bot. Monats. (18:26-27. 1900) W. N. SUKSDORF publishes three new species of Saxifraga, and a new variety of Vicia Americana, all from Washington .-- J. M. C.